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Addendum

REVISED 1996 IPCC GUIDELINES FOR NATIONAL GREENHOUSE GAS INVENTORIES

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I. INTRODUCTION

A. Mandate

1. The Intergovernmental Negotiating Committee, at its ninth session, held from 7 to 18 February 1994, adopted decisions 9/1 on methodological issues and 9/2 on guidelines for the preparation of first communications by Parties included in Annex I to the Convention (Annex I Parties). Decision 9/2 stipulated that "the IPCC Draft Guidelines for National Greenhouse Gas Inventories should be used in estimating, reporting and verifying inventory data ... Countries that already have an established and comparable methodology could continue to use that methodology, provided that they include sufficient documentation to back up the data presented" (A/AC.237/55, annex I). The Conference of the Parties (COP), at its first session, adopted decision 3/CP.1[1] which stipulates that the guidelines for the preparation of first communications by Annex I Parties, as elaborated in the annex to decision 9/2 of the Committee, should continue to be used by Annex I Parties in preparing their communications. It also stipulates that Annex I Parties should submit annually their emission inventory data by 15 April. By its decision 4/CP.1, the Conference of the Parties decided to use the Intergovernmental Panel on Climate Change (IPCC) *Guidelines for National Greenhouse Gas Inventories* for the preparation of communications by Parties included in Annex I to the Convention.

2. At its second session, the Conference of the Parties, by its decision 9/CP.2,[2] adopted revised guidelines for the preparation of communications by Parties included in Annex I to the Convention. It also stipulated that anthropogenic emissions and removals by sinks of all greenhouse gases (GHG) should be reported in a complete, transparent and comparable way that avoids double-counting or incomplete counting and it requested the Subsidiary Body for Scientific and Technological Advice (SBSTA) to consider, at its fourth session, any other possible additional revisions to the guidelines arising from, *inter alia*, any modifications to the *IPCC Guidelines for National Greenhouse Gas Inventories*. At the same session, the COP also decided (decision 10/CP.2) that the *IPCC Guidelines for National Greenhouse Gas Inventories*[3] or the simplified default methodologies adopted by the IPCC should be used by non-Annex I Parties, as appropriate and to the extent possible, in the fulfilment of their commitments under the Convention.

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[1]For decisions adopted by the Conference of the Parties at its first session, see document FCCC/CP/1995/7/Add.1.

[2]For decisions adopted by the Conference of the Parties at its second session, see document FCCC/CP/1996/15/Add.1.

[3]*IPCC Guidelines for National Greenhouse Gas Inventories* (1995): Reporting Instructions (volume 1); Workbook (volume 2), and Reference Manual (volume 3).

3. Also, by its decision 9/CP.2, the Conference of the Parties decided that Annex I Parties should report on partially fluorinated hydrocarbons (HFCs), perfluorinated hydrocarbons (PFCs) and sulphur hexafluoride (SF_6). According to decision 10/CP.2, non-Annex I Parties are encouraged to include partially fluorinated compounds in their national inventories, as appropriate.

B. Scope of the note

4. The purpose of this note is to provide the SBSTA with an overview of the most important revisions and additions to the *IPCC Guidelines for National Greenhouse Gas Inventories* as approved by the twelfth plenary session of the IPCC, held in Mexico City from 11 to 13 September 1996. It also identifies issues for consideration by the SBSTA regarding their adoption and implementation. The revised guidelines, including revisions and additions, are referred to in this document as the *Revised 1996 Guidelines*[4] and the original guidelines are referred to as *IPCC Guidelines* (1995).

C. Possible actions by the Subsidiary Body for Scientific and Technological Advice

5. On the basis of this note, the SBSTA may wish to:

(a) Approve the *Revised 1996 Guidelines* developed by the IPCC. In this regard Parties may wish to clarify the approach by which emissions related to the consumption of HFCs, PFCs and SF_6 are to be reported; and, if approved,

(b) Decide how Parties should use the *Revised 1996 Guidelines* to report GHG inventories.

II. BACKGROUND

Overview

6. The IPCC initiated work to revise the *IPCC Guidelines (1995)* at its tenth session, held in Nairobi from 10 to 12 November 1994, for the following sectors: (a) fuel combustion, (b) industrial processes, (c) land-use change and forestry, (d) agricultural soils, and (e) waste. At its eleventh session, held in Rome from 11 to 15 December 1995, the IPCC decided to incorporate methane emissions from rice cultivation. It subsequently accelerated work on this sector at the behest of the SBSTA (FCCC/SBSTA/1996/8, annex III).

7. The IPCC convened seven expert groups to address the various methodological issues. More than 200 scientists and technical experts, approximately half of them from developing

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[4] *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories.*

countries, contributed to the process. The *Revised 1996 Guidelines* underwent an expert peer review and a governmental review during the summer of 1996.

8. The IPCC focused on revising and simplifying methods and incorporating new data in particular relating to developing countries. The basic structure of the guidelines has not changed, but improvements and additional data are provided. For example, the basic methods for estimating CO_2 in the energy and transportation sectors do not change significantly. Similarly the methods for estimating emissions from the cement industry and from major sources of nitrous oxide (N_2O) such as synthetic fertilizers do not change. The revisions provide additional details and source categories and more country or region-specific emission and activity data that may be useful particularly to non-Annex I Parties, for example, on methane emissions from rice cultivation. Also, in developing the guidelines, an effort was made to harmonize the methodologies with other international emission inventory methods, such as CORINAIR.

9. The *Revised 1996 Guidelines* provide methods for estimating emissions of HFCs, PFCs and SF_6, thereby supporting important provisions of decisions 9/CP.2 and 10/CP.2. The HFCs and PFCs are alternatives to ozone-depleting substances and are not controlled under the Montreal Protocol on Substances that Deplete the Ozone Layer. The use of HFCs and some PFCs is expected to grow in the future. It is anticipated that these two compounds will be used in refrigeration and air-conditioning, fire suppression, aerosol sprays, solvent cleaning and foam blowing. SF_6 is used in gas insulation switchgear, circuit-breakers, fire suppression and other applications. The chemicals have high global warming potentials and some have long atmospheric residence times. In some instances they are the by-products of industrial processes.

10. The *Revised 1996 Guidelines* indicate that emissions of HFCs, PFCs and SF_6 can be estimated using either of two approaches, namely, a *potential* emission approach or an *actual* emission approach.[5, 6] The former approach uses annual data on production, exports, imports and destruction which are generally available to most countries. The emission estimates so derived tend to be high because they do not take into consideration storage in equipment and the slow release of the chemicals over time. Over a period of 15-30 years the error will tend

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[5] Section 2.17.3, page 2.61, of the *Revised 1996 Guidelines* says "Potential emission calculations are regarded as the basic methodology for HFC and PFC emission estimates, which any country **should** apply. However, if relevant information is available, it **is recommended** that emissions are reported according to the actual emission method". The recommended method for SF_6 according to section 2.17.5.1, page 2.68, is based on an actual emission approach, except where data are unavailable, then it should be assumed that emissions equal consumption.

[6] The Revised 1996 Guidelines generally provide a default methodology and, for countries with sufficient data, a more advanced method. Countries are urged to use the advanced method where possible. No systematic analysis has been undertaken to determine which methods countries have elected to use and what the effect would have been had they used an alternative approach.

toward zero as products are retired. This approach to reporting has been adopted by the Montreal Protocol.

11. The *actual* approach attempts to take into account the time lag between consumption and emissions. The time lag occurs because chemicals used in new equipment tend to leak out over time, more specifically during manufacturing, operation and disposal. The IPCC provides formulae and leakage coefficients from the literature, assuming an equipment lifetime of 15-30 years, to estimate annual emissions. This approach provides low estimates in the early years. It tends to mask the possible long-term implications of chemicals accumulating in equipment and products.

12. It should be noted that the approaches used to calculate emissions from solid waste disposal sites (default methodology) and from some agricultural sources also recognize the time-dependent nature of emissions. However, these activities have been going on for a long time and the level of these activities generally changes slowly. The choice of approach is likely to matter much less than for a new chemical whose use is growing rapidly.

13. The revised guidelines were accepted by the twelfth session of the IPCC, held in Mexico City from 11 to 13 September 1996. A summary of the revised guidelines, as provided by the IPCC secretariat, is given in the annex. The IPCC considered, but did not accept, a new methodology on harvested wood products. It will hold an expert meeting on the subject in 1997.

14. The guidelines are not expected to be revised significantly in the near future, i.e., prior to the year 2000, unless new scientific and technical information becomes available, revisions are requested by a participating State of the IPCC, or the SBSTA requests the IPCC to prepare additional revisions. Some minor revisions might occur, for example, if the IPCC were to reach agreement on wood products. Additional regional and country-specific emission factors could be compiled if warranted. A process to provide an addendum with such data on emission factors could be explored.

III. ISSUES FOR CONSIDERATION BY THE SUBSIDIARY BODY FOR SCIENTIFIC AND TECHNOLOGICAL ADVICE

Adoption of the IPCC Revised 1996 Guidelines

15. Many Annex I Parties are currently preparing their second national communication, including national emission inventories, due by 15 April 1997. Non-Annex I Parties are also preparing their GHG emission inventories. Given the limited resources for these activities, it is important for the SBSTA to determine whether it wishes to adopt a decision recommending the use of all or part of the *Revised 1996 Guidelines* so that Parties will know how to proceed.

Approach for reporting HFC, PFC and SF_6 emissions

16. The two approaches described above for HFC, PFC and SF_6 emissions will generally provide different estimates. Each approach has its merits, but the policy implications differ. Also, the IPCC guidelines could be applied differently by the Parties, which could lead to inconsistent emission inventories and projections among Parties. The SBSTA may wish to clarify which approach should be used for reporting national emission inventories of these gases, since the demand for some is growing significantly world wide.

When should the Parties start using the Revised 1996 Guidelines for reporting?

Annex I Parties

17. If the SBSTA adopts all or part of the *Revised 1996 Guidelines* for reporting, this would have several technical, policy and financial consequences for Annex I Parties.

18. First, the application of the methods could make it more difficult to assess long-term trends, since it would create an appearance of higher emissions owing solely to the reporting of new industrial gases by many Parties. Also, improvements to the methods are likely to cause some change in emissions in several other source categories. To make it easier to analyse such data, the usual practice of the scientific community, when introducing a revised methodology or new instrument, is to utilize both methods simultaneously for a period of time. The aim is to collect and compare two sets of data in order to build confidence in the new technique and to understand the differences.

19. Using the revised methodology could also have several policy implications. For example, it could affect how progress by Annex I Parties towards meeting their national 1990 to 2000 aims is assessed. Also, the choice of the method and base year could be relevant to a possible future protocol or other legal instrument. While it would not appear practical or appropriate to use a revised data set as a means to assess whether Annex I Parties have achieved commitments made at an earlier time on a different basis, the SBSTA may wish to consider this issue when providing guidance for future compilation and synthesis reports. The SBSTA may wish to call the attention of the SBI and the AGBM to the latter issue.

20. With regard to the technical issue of how to ensure that long-term trends can be assessed, the SBSTA may wish to consider the following options while bearing in mind the possible financial implications:

(a) Apply the revised guidelines to recalculate 1990 GHG inventories (and any other base year) and all subsequent years;

(b) Apply the revised methods as a supplement to the IPCC Guidelines (1995) on a voluntary basis for inventories due in April 1997 and on a mandatory basis for inventories due in 1998 and 1999. Inventories due after 1999 would use only the revised guidelines. On

the basis of the 1997-1999 data, develop "factors" to estimate any gap created by the revised method. Such factors might then be used to compare data sets;

(c) Apply both methods, initially on a voluntary basis in 1997, and thereafter for all years till 2002, that is, until data for the year 2000 are provided.

Non-Annex I Parties

21. According to decision 10/CP.2, the *Guidelines for National Greenhouse Gas Inventories (1995)* or the simplified default methodologies adopted by the IPCC should be used by non-Annex I Parties, as appropriate and to the extent possible, in the fulfilment of their commitments under the Convention. Non-Annex I Parties should provide the best available data in their inventory. To this end such data should be provided for the year 1994. Alternatively, non-Annex I Parties may provide such data for the year 1990. Information should be provided on the following greenhouse gases: carbon dioxide (CO_2), methane (CH_4) and nitrous oxide (N_2O), to the extent the Party's capacities permit. In addition, Parties are encouraged to include in their national inventories the fully-fluorinated compounds, as appropriate.

22. Since non-Annex I Parties are preparing their inventories for the first time, there are yet no trends to be assessed. Furthermore, the revised guidelines do more adequately reflect the conditions in developing countries than the IPCC Guidelines (1995). Consequently, the SBSTA may wish to urge non-Annex I Parties to apply the *Revised 1996 Guidelines*, as appropriate, in reporting their initial national GHG inventories.

How much flexibility should Parties be allowed in calculating emissions in the future?

23. The *IPCC Guidelines (1995)* allow Parties to utilize default methods, more accurate and advanced methods (Tier 2) or methods of their choice, providing they document the methods. The extent to which Parties have chosen to use different methods is not fully known. It is also not known whether the current flexible approach makes a significant difference in emission estimates and how incompatible data and poor statistics affect emission estimates. If the SBSTA wishes to assess the desirability of changes in this approach, it may be useful to obtain further information. In this regard the secretariat could be asked to perform additional analysis. The SBSTA may also wish to call this question to the attention of the AGBM.

Annex

A SUMMARY OF *REVISED 1996 IPCC GUIDELINES FOR NATIONAL GREENHOUSE GAS INVENTORIES* *

1. Background

1.1 This annex, including Table 1, summarises the additions and revisions to the *1995 IPCC Guidelines for National Greenhouse Gas Inventories (1995 IPCC Guidelines)*. It also describes efforts made by the IPCC to harmonize methods with others. The additions and revisions were accepted by the IPCC at its Twelfth Session held in Mexico City (11-13 September 1996) after acceptance by Working Group I at its Sixth Session held in Mexico City (10 September 1996) in accordance with IPCC procedures. They are called the *Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories*. Within this annex, a revision of an existing methodology or default data is referred to as a *'revision'*, *'revised method'* or *'revised data'*. Additional methods and default data are defined as *'new'* methods or *'new data'*.

2. Energy Chapter

2.1 The energy chapter contains the following improvements and additions:

- harmonisation of international (IPCC and CORINAIR) emission estimation methodologies and allocating of emissions from autoproducers to the sector where they are generated and not to the transformation[1] sector (*revision*);
- development of a *new* Tier 1 method for estimating non-CO_2 Greenhouse Gas (GHG) and SO_2 emissions based on fuel consumption;
- development of a *new* Tier 2 method for estimating emissions from aircraft;
- inclusion of *new* default values for various types of traditional biomass fuels;
- clarification of the definition of National Navigation (the definition of International Marine Bunkers remains unchanged)

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*Text reproduced as received from the IPCC secretariat.

[1]The transformation sector comprises the conversion of primary energy forms of energy to secondary and further transformation, e.g. coking coal to coke, heavy fuel oil to electricity.

3. Industrial Processes Chapter

3.1 The industrial process chapter contains a broad range of *new* estimation methodologies for the so-called "new gases", that is perfluorocarbons, PFCs (e.g. CF_4 and C_2F_6), HFCs (e.g. HFC-125 and HFC-134a), sulphur hexafluoride (SF_6), the direct GHG (CO_2, CH_4, and N_2O), and ozone and aerosol precursors (SO_2, NO_x, CO, NMVOC) from industrial non-energy processes.

3.2 Direct GHG. The *new* methodologies cover CO_2, CH_4, and N_2O emissions from the production of mineral compounds, chemical industries and metal manufacture. The estimation of CO_2 emissions from cement production remains unchanged, but the methodologies for N_2O emissions from nitric and adipic acid production have been improved and revised.

3.3 Aerosol and ozone precursors. For SO_2, NOx, CO, NMVOC, *new* methodologies are presented, which draw upon and improve existing international methodologies. The sectors covered are: mineral compounds production, chemical industries and metal manufacture.

3.4 Fluorocarbons and SF_6. For HFCs and PFCs, and SF_6, methodologies are provided to estimate by-product and fugitive emissions from aluminium (Al) and magnesium (Mg) manufacturing processes, as well as emissions from their production and consumption. Two approaches are given: Tier 1 (a, b) for *potential* emissions, and Tier 2, for *actual* emissions. *Potential emissions* of PFCs, HFCs, and SF_6 are equal to the amount of a chemical consumed in a country, minus the amount of a chemical recovered for destruction or export in the year of consideration. *Actual* emissions estimates take into account the time lag between consumption and emissions. The Tier 2 methodology is, therefore, the most accurate estimation approach.

4. Land-use Change and Forestry Chapter

4.1 Several revisions to the methods for the Land-use Change and Forestry chapter are provided. One such revision is the method for estimating CO_2 fluxes from soils, as described below.

4.2 The *revisions* to the Land-Use Change and Forestry Chapter greatly extend and improve the range and quality of the default data, particularly for the tropics, where national forestry statistics are sometimes less easily accessible than those data in the temperate or boreal regions. The *revisions* can be summarised by changes in (a) default data and in (b) methods, as follows:

(a) Default data

Classification system for land cover types: A *revised* system more consistent with sources of national, regional and international data, such as forest conversion rates and forest inventories was developed. The *revised* classification system better reflects the

diversity of forest types. For the tropics, three classes of forests have been replaced with six, based on differences in rainfall amount, seasonality, and altitude.

Rates of forest conversion. *New* FAO default data are provided for each country and forest type according to the proposed land-cover classification system. These data have been compiled for the tropics for the 1980-90 period. Such *revisions* were incorporated because country-level data are often difficult to obtain for many tropical countries, the *1995 IPCC Guidelines* contain no such data.

Aboveground biomass for native tropical forests. Emissions estimates from the land-use change and forestry can be highly sensitive to such input data and therefore a priority was given to improving aboveground biomass data. Since publication of the *1995 IPCC Guidelines*, better datasets have become available drawing upon larger regional studies. The *revisions* now include a large database of default values for Africa, America, and Asia for the *revised* land-cover classification system. Additional data based on individual forest inventories (suitable for converting to biomass) for many tropical countries are also included. None of the default values are separated into primary and secondary forests (as in the *1995 IPCC Guidelines*) because it was felt by experts that this was not a practical classification, given the variability of definitions in different regions.

Rates of tropical forest regrowth. *Revised* default data are given for forest regrowth, the data are related to the biomass data and are reported for the three tropical regions by forest type according to the *revised* classification system.

(b) Methods

Estimation of net CO_2 emissions from soil carbon. In the *1995 IPCC Guidelines*, CO_2 estimates are based upon the product of the rate of change in area of a given land-use and the rate of change of soil carbon. The *revised* method estimates changes in soil carbon pools associated with altered land-use or land management practices. Thus, all categories of agriculturally-impacted lands, including conversions of forest or other vegetation to agriculture, land abandonment, shifting cultivation and permanent agriculture, are included in the methodology. A default stock method is employed to estimate CO_2 fluxes associated with agricultural activities for a 20-year inventory period. This area of the IPCC methodology has been much improved because better scientific data is now available. The *revised* method is more compatible with potential policy analysis.

5. Agriculture Chapter

5.1 Three sections of this chapter have been *revised*, that is, (1) methane emissions from rice cultivation, (2) nitrous oxide emissions from agricultural soils and (3) manure

management. For the estimation of N_2O emissions, the proposed default methods and data are essentially *new*.

5.2 **Methane Emissions from Rice Cultivation**. In the *1995 IPCC Guidelines*, the estimation of CH_4 emissions from wetland rice cultivation is a function of the CH_4 emission factor, area of rice cultivated and the season length. One critical default parameter is the CH_4 emission factor, which is based upon temperature. It was determined that the relationship between CH_4 emissions and soil temperature as assumed in the *1995 IPCC Guidelines* was no longer appropriate because new data suggest that the seasonally integrated CH_4 flux depends much more on the input of organic carbon, water regime, time and duration of drainage and soil type than on local temperature. The *revised* methodology is a function of the emission factor integrated over a cropping season for particular rice water regime, for a given organic amendment, and of the annual harvested area cultivated under these conditions. The latter is given by the cultivated area times the number of cropping seasons per year.

5.3 The *revisions* to the method use internationally-agreed definitions for rice eco-systems classified according to the water regime and a range of CH_4 emission scaling factors relative to continuously flooded rice eco-systems for soils without organic amendment. A default seasonally integrated emission factor is also provided for the continuously-flooded regime, without-organic amendment.

5.4 **Nitrous Oxide Emissions from Agricultural Soils and Manure Management**. A *new* default method for calculating national emissions of N_2O from agriculture is provided. The *new* N_2O method is a revision of the method in the *1995 IPCC Guidelines*. It includes more sources of N_2O from agricultural activities and makes explicit recommendations on N_2O emission factors. The *new* method accounts for the application of N-fertilisers to the soil and N uptake in crops and subsequently tracks the flow of N as it moves through the (anthropogenic) animal and human food chain. Three categories of N_2O sources are distinguished in the *new* methodology, (1) direct emissions from agricultural soils, (2) emissions from animal production, and (3) N_2O emissions indirectly induced by agricultural activities[2]. Because a larger number of sources and pathways are considered, the *new* N_2O methodology affects several source sectors. Emissions are reported in several sections of the *Guidelines*, namely, Manure Management (Section 4.2, *1995 IPCC Guidelines*), Agricultural Soils (Section 4.5, *1995 IPCC Guidelines*), and Waste (Section 6.3, *1995 IPCC Guidelines*). The input data required can be obtained from FAO databases.

5.5 The *new* method provides a comprehensive description of N_2O emissions from agriculturally-related activities by accounting for previously omitted N_2O sources. Using this method, global N_2O emission estimates imply that atmospheric N_2O input from agricultural

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[2] It is however recognized that there are other sources of anthropogenic atmospheric inputs of N-compounds to soils e.g., NO_x from fuel combustion. Only compounds directly applied to agricultural soils are considered.

production as a whole has apparently been previously underestimated by at least 70%. Nitrous oxide emissions resulting from atmospheric deposition are assigned to the NO_3 or NH_3 emitting country[3].

6. Waste

6.1 The chapter on waste addresses various topics, including: improved waste disposal data, evaluation of the methodologies for solid waste and wastewater, definitions of activities and uncertainties of CH_4 emission estimates. The main improvements to the methods and default data are as follows:

6.2 Solid Waste

Site classification. A *new* term - solid waste disposal site - has been proposed to refer to all sites and to replace the terminology in the *1995 IPCC Guidelines* for 'landfills' and 'open dumps'. The *new* term was proposed because experience suggests that the existing categories do not adequately include the entire range of waste disposal sites that exist in all countries. Solid waste disposal sites include all sites where waste is deposited and is likely to generate some methane. Sites are further classified according to the level of site management and depth.

Methane correction factor. The *new* site classification is used to derive a methane correction factor (MCF) to account for the methane generation potential of the site. The amount of methane produced depends in part upon the available oxygen and the level of compaction of the waste. In general, waste in managed sites potentially generates more methane than waste in unmanaged sites. Furthermore, the deeper the site, the greater the methane generation potential. The methane correction factor for each type of site reflects these differences in methane generation potential. The site classification recognises that some developing countries, or countries with-economies-in-transition, may have a majority of less-well managed or unmanaged sites, often with a lower methane-producing potential than well managed sites.

Waste data. A wide range of *revised* and *new* default data on waste generation, composition and disposal data in many additional developed and developing countries is provided. A definition for Municipal Solid Waste and a method for calculating the Degradable Organic Carbon content of various waste streams are now included in the *revised* chapter.

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[3] In some countries and regions other conventions related to long range transboundary air pollution are addressing the issue of atmospheric transport and deposition in greater detail.

Methodology The default methodology was evaluated and retained The methodology uses a zero-order equation requiring data on population, waste landfills, and waste composition as proposed by Bingemar and Crutzen (1987)

6.3 Wastewater

A *revised* method and default data for calculating emissions from wastewater and sludge is included The amount of CH_4 produced from these systems depends upon several factors, including the characteristics of the wastewater and the management system, and temperature These factors are highly dependent upon the waste treatment system used The *revised* methodology allows countries to tailor the estimation approaches more precisely to their wastewater management systems This is accomplished by MCF that accounts for the differing CH_4 generating potential of different wastewater management systems In addition, the *revised* methodology uses data that is commonly available from most countries, or which can be estimated by wastewater experts

6.4 Human sewage

A *new* methodology and default data are provided for the estimation of N_2O nitrous oxide emissions from human sewage disposed to land, and in subsequent run-off to rivers and estuaries There is no such methodology in the *1995 IPCC Guidelines*

7. Harmonisation of International Emission Estimation Methodologies

7 1 Progress has been made in the harmonisation of the IPCC and EMEP/CORINAIR methodologies to allow more direct comparison of the two approaches These changes are mainly in the energy chapter, but harmonisation was a theme in all other chapters, including industrial processes Examples of harmonisation are given below from the energy chapter

- Biomass fuels are allocated to the various source categories (*new*) As in the *1995 IPCC Guidelines*, CO_2 from biomass will not be reported in national totals as this is captured in the Land-use Change and Forestry Chapter

- Emissions from fuel used for electricity and heat production by autoproducers will be included in the sector where it is generated and not with the transformation industries

- Treatment of evaporative emissions (NMVOCs) from road transport in the Tier 2 method of IPCC is made consistent with CORINAIR Combustion and evaporative emissions are to be reported separately However, in the *new* Tier I IPCC method, all emissions from road transport are included together under fuel combustion

- Development of a *new* Tier 2 method for estimating emissions from aircraft

References

Australian Methodology for the Estimation of Greenhouse Gas Emissions and Sinks (1996).

Joint EMEP/CORINAIR Atmospheric Emission Inventory Guidebook (1996), 1st Edition, European Environmental Agency.

1995 IPCC Guidelines for National Greenhouse Gas Inventories: Reporting Instructions (Volume 1); Workbook (Volume 2); Reference Manual (Volume 3).

LIST OF ABBREVIATIONS

CO_2	Carbon dioxide
CH_4	Methane
N_2O	Nitrous oxide
SO_2	Sulphur dioxide
NO_x	Sum of nitrogen oxide and nitrogen dioxide
CO	Carbon monoxide
NH_3	Ammonia
NMVOC	Non-methane volatile organic compounds

Table 1. Additions/revisions to the *IPCC Guidelines for National Greenhouse Gas Inventories 1995*

Chapter[1]	Volume	Document Title	Summary of proposed additions/revisions[2]
1. Energy	Reference Manual (Volume 3)	Chapter 1, Energy	The main changes are : - assignment of GHG emissions from autoproducers to the sector where they were generated and not to the transformation sector (*revision*); - development of a Tier 1 method for estimating non-CO_2 GH[illegible] and SO_2 emissions based on fuel consumption (*new*); - development of a Tier 2 method for estimating emissions from aircraft (*new*); - inclusion of default values for various types of traditional biomass fuels (*new*), and - clarification of the definition of National Navigation (the definition of International Marine Bunkers remains unchanged).
	Workbook (Volume 2)	Module 1, Energy	

Table 1. (Continued)

Chapter[1]	Volume	Document Title	Summary of proposed additions/revisions[2]
2. Industrial Processes	Reference Manual (Volume 3)	Chapter 2, Industrial Processes	*New* methods and default data are proposed for the estimation of emissions of direct greenhouse gases (CO_2, CH_4, and N_2O) and SO_2 from : - mineral production; - chemical industries, - metal manufacture. - ozone precursors (NOx, CO, NMVOC) from : - chemical industries - metal manufacture and halocarbons (PFCs, HFCs) and sulphur hexafluoride (SF_6) from industrial processes and uses. The following methods are proposed: - Tier 1 (a): for bulk chemicals; - Tier 1 (b): for bulk chemicals and chemicals stored in products; -Tier 2 : product (containing PFCs, HFCs, SF_6) lifetimes are taken into account.

1 Chapter 3, "Solvents and other product use" has not been revised.
2 A revision of an existing methodology or default data is referred to as a '*revision*'. In cases where an additional method has been developed and default data provided, this is defined as '*new*'.

Table 1. (Continued)

Chapter[1]	Volume	Document Title	Summary of additions/revisions[2]
4. Agriculture	Reference Manual (Volume 3)	Chapter 4 Agriculture Methane Emissions from Rice Cultivation	Revised method and *new* default data for the estimation of Methane Emissions from Rice Cultivation are proposed. The *revised* method uses -internationally-agreed definitions of rice ecosystems (*revision*), - default data (e.g. seasonally integrated CH_4 emission factors) (*new*), - scaling factors for CH_4 emissions factors relative to continuously flooded fields (without-organic amendment.) (*new*)
	Reference Manual (Volume 3)	Chapter 4 Nitrous oxides from agricultural soils and manure management	Additions and revisions include -default method for the estimation of nitrous oxide emissions from Manure Management and Agricultural soils (*new*), - *revised* default emission factors for the estimation of direct emissions of N_2O from soils (*revision*), and - default data (e.g. N_2O emission factors for animal waste and for indirect emissions) (*new*)
	Workbook (Volume 2)	Module 4, Agriculture Nitrous oxides from Agricultural Soils and Manure Management	
5. Land-Use Change & Forestry	Reference Manual (Volume 3)	Chapter 5, Land-use Change & Forestry	*Revised / new* default data and classification are suggested for - land-cover types (*revision*), - rates of forest conversion (*new*), - aboveground biomass for native tropical forests (*revision*), - rates of tropical forest regrowth (*revision*). Method for the estimation of CO_2 fluxes from agricultural soils (*revision*) and default data (*new*)
	Workbook (Volume 2)	Module 5, Land-use Change & Forestry	

Table 1. (Continued)

Chapter[1]	Volume	Document Title	Summary of proposed additions/revisions[2]
6. Waste	Volume 3 (Reference Manual)	Chapter 6, Waste	Solid waste disposal Revised/new data and classification are listed below for - solid waste disposal site classification: definition encompasses all sites; - methane correction factor to account for the methane generation potential of the site (*new*), - wider range of default data for waste generation, composition and disposal data (*revision*) Wastewater - *revised* approach and default data for calculating CH_4 emissions (*revision*) and Human sewage - human sewage method and default data for the estimation of N_2O emissions (*new*)
	Workbook (Volume 2)	Module 6, Waste	